

1 WHAT IS CLAIMED IS:

2 1. A rear gate opening and closing apparatus for  
3 automatically opening and closing a rear gate of a vehicle, said  
4 rear gate pivotally connected at the upper end thereof with a  
5 vehicle body so as to swing upward and downward, comprising:

6 a power source means for producing a power to actuate  
7 said rear gate;

8 a slider for transforming said power into a  
9 reciprocating motion and traveling in the longitudinal direction  
10 of said vehicle;

11 a hinge arm provided at the upper end of said rear gate  
12 for pivotally connected with said vehicle body;

13 a connecting rod for interlocking between said slider  
14 and said hinge arm and for transmitting said reciprocating motion  
15 to said hinge arm;

16 a mounting base for supporting said power source means  
17 and said slider;

18 a mounting base installing means for detachably  
19 installing said mounting base in a space formed by a rear rail,  
20 a side rail and an under roof of said vehicle; and

21 a gas stay extending in the longitudinal direction of  
22 said vehicle, provided between said side rail and said hinge arm  
23 and disposed at approximately the same height as and in parallel  
24 with said connecting rod for biasing said rear gate in an opening  
25 direction.

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- 2 2. The apparatus according to claim 1, wherein
- 3       said mounting base is partly installed on a brace
- 4       extending in the transverse direction of said vehicle.
- 5
- 6 3. The apparatus according to claim 1, further
- 7 comprising;
- 8       a clutch means for disconnecting said power source
- 9       means with said slider so as to enable an operator to open or
- 10      close said rear gate by hand.
- 11
- 12 4. The apparatus according to claim 1, further
- 13 comprising;
- 14       a position detecting means for detecting a position
- 15       of said rear gate and for outputting a detection signal thereof;
- 16       an operating means for operating an opening and closing
- 17       motion of said rear gate; and
- 18       a control means for automatically opening and closing
- 19       said rear gate based on an operating signal from said operating
- 20       means.
- 21
- 22 5. The apparatus according to claim 4, wherein
- 23       said control means controls an opening and closing
- 24       speed of said rear gate based on said detection signal from said
- 25       position detecting means.

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2     6.       The apparatus according to claim 4, wherein  
3               said control means controls an opening and closing  
4               speed at a speed determined beforehand so as to assist the rotation  
5               in an opening direction when said rear gate is in a self closing  
6               zone and to restrict the rotation in an opening direction when  
7               said rear gate is in a self opening zone.

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9     7.       The apparatus according to claim 4, wherein  
10              said control means controls an opening and closing  
11              speed at a speed determined beforehand so as to rotate the rear  
12              gate in a closing direction against a biasing force of said gas  
13              stay when said rear gate is in a self opening zone and to restrict  
14              the rotation in a closing direction when said rear gate is in  
15              a self closing zone.

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17    8.       The apparatus according to claim 4, wherein  
18              said control means judges a fully opened or closed  
19              condition of said rear gate based on said detection signal.

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21    9.       The apparatus according to claim 4, wherein  
22              said control means judges a fully opened or closed  
23              condition of said rear gate based on a load of said power source  
24              means.

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- 1 10. The apparatus according to claim 4, wherein  
2 said apparatus has a warning means for raising an alarm  
3 during the opening and closing operation of said rear gate.  
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- 5 11. The apparatus according to claim 4, wherein  
6 said control means judges whether or not the opening  
7 and closing operation is performed automatically based on a speed  
8 of said rear gate at which said rear gate is manually operated.  
9
- 10 12. The apparatus according to claim 4, wherein  
11 said apparatus has a handle switch for manually opening  
12 and closing said rear gate and said control means stops an  
13 automatic operation of said rear gate based on a detection signal  
14 of said handle switch and disengages said clutch.  
15
- 16 13. The apparatus according to claim 4, wherein  
17 said apparatus has a latch switch for detecting a fully  
18 closed condition of said rear gate and for outputting a detection  
19 signal and said control means initializes said position of said  
20 rear gate.